POWER BEAM

INSTALLATION AND MAINTENANCE INSTRUCTIONS

MODEL
250 AND 325
"IA" PNEUMATIC
VERSION "D"
FORM 106-854

A. DESCRIPTION:

Model 250 and 325 POWER BEAMS, are fully enclosed rodless cylinder style, linear drives. POWER BEAM is available in stroke lengths of up to 18' and capable of handling loads of 450 and 700 pounds of Models 250 and 325 respectively. The unique guided carriage absorbs yaw, pitch, and roll forces without requiring separate external guide rods or additional load supports.

B. OPERATION:

POWER BEAM "IA" has a pneumatically driven piston connected to the guided carriage by high tensile steel cables. The carriage runs on a modern linear rail using two heavy duty, multi-row linear bearing blocks.

Inertia forces generated during high-speed, heavy load handling are controlled over a deceleration distance of up to 7". The inertia cushion control is external and manually adjustable.

POWER BEAM is designed to operate at 80 psig but can be used over a pressure range from 50 to 150 psig, subject to specific installation conditions. The standard unit operates over an ambient temperature range from –10 to 40 degrees C., provided that condensation does not occur, either internally or externally during operation.

C. CONSTRUCTION: (refer to Fig. 1)

A high strength aluminum "H" section beam supports one linear rail and carries the load over the full stroke length without requiring extra supports. The combination of "H" section beam, linear rail, and linear bearings provide a near frictionless system for heavy load handling
All loads are carried by the beam and carriage. The double acting piston is isolated from all forces, except the pneumatic driving force. Piston seal, wear ring, and cylinder wall have extremely long life, since no side or angular loads are ever applied. The linear rail, linear bearings, and cable, are protected from workplace contamination by the unit's sealed aluminum enclosure. The enclosure ensures that the designed service life will routinely be achieved; free from accidental damage to the working parts, and premature wear due to environmental dirt. A standard "purge port" is provided on enclosure, to allow application of low pressure (1-3 psig) compressed air to reduce contaminants and provide some "cooling" effect.

D1. INSTALLATION:

Each unit is prepared at the factory and is ready for installation when received. Mounting bolts are included with the unit.

Remove POWER BEAM from the carton, and check the nameplate for correct catalogue number, maximum force, working fluid, and accessories.

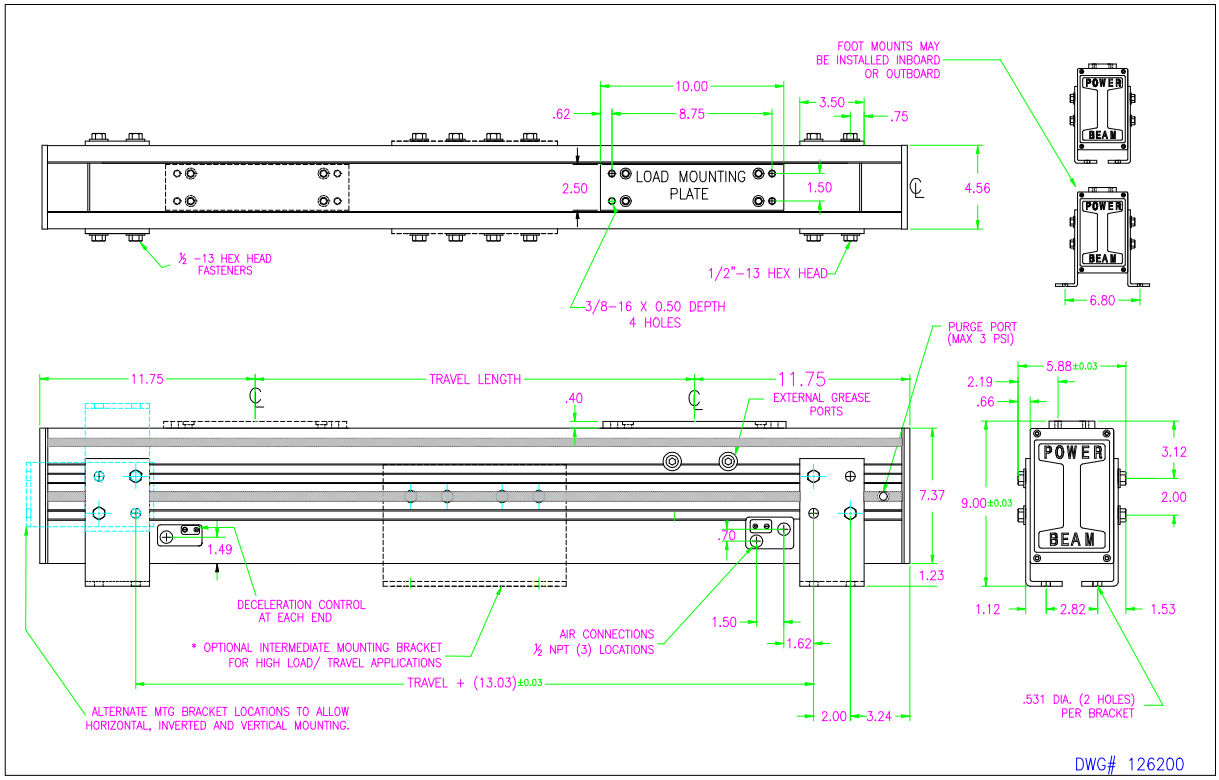
POWER BEAM may be mounted in any position. (Mounting with carriage plate facing up, down, or vertical, is preferred for greatest dust belt life.) Maximum load forces should not exceed the ratings as per Fig. 2. for various supply pressures.

D2. INSTALLATION:

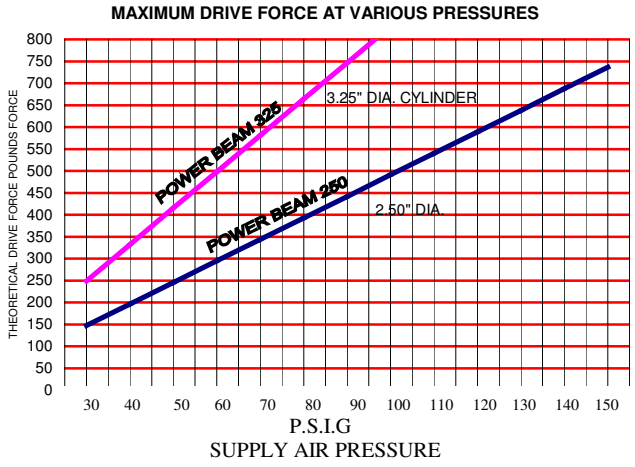
Air supply and exhaust connections are made to POWER BEAM via pressure ports as illustrated in Fig. 3. The user may elect to use both pressure and exhaust ports located in one end of the cylinder, or single ports located in each end of the cylinder. All ports are ½" NPT female connections.

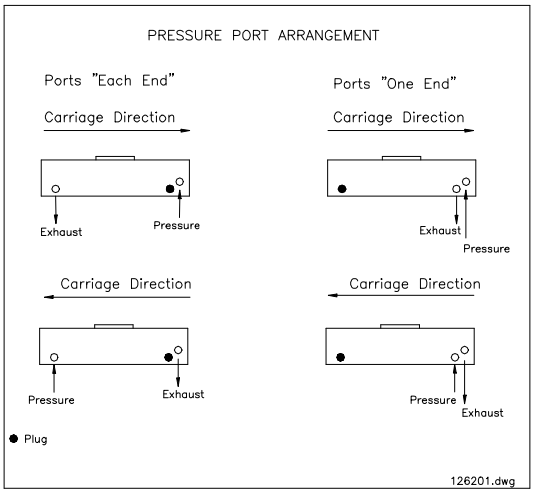
Cylinder speed can be controlled via airline restrictors on either pressure or exhaust ports. Exhaust backpressure controls should always be used to ensure smooth carriage movement and minimum loss of speed when driving against intermittent loads.

End of stroke deceleration needle valves are provided. To set, turn the screws fully in and back them off until a smooth deceleration is achieved for the specific working load.



NOTE: Metric specifications available, consult factory. CAD files available, see WWW.powerbeam.ca





E.AIR SUPPLY CONTROL

Air supply to POWER BEAM can be controlled with a directional pneumatic solenoid operated valve. Several valving arrangements can be utilized to control the POWER BEAM:

FULL STROKE HORIZONTAL MOVEMENT: A two-position, single or dual solenoid valve can be used.

FULL STROKE VERTICAL MOVEMENT: Although a two-position single or double solenoid valve may be used with satisfactory results, a "dual-pressure" valve can provide optimum performance. (Consult factory)

MULTI-POSITION HORIZONTAL MOVEMENT: A three-position, dual solenoid valve is recommended. Specifying a "blocked center" version will allow load stopping and holding at mid-positions. (CAUTION: with a blocked center valve, any leaks in system will result in drifting and possible start-up "lurching", "run-away".) A "dual-supply center" valve will provide a consistent mid-position stopping capability with limited holding capability, but will compensate for minimum leakage in system. (Consult factory re: valve type and optional load holding brake)

MULTI-POSITION VERTICAL MOVEMENT: The most difficult of pneumatic applications, this is best accomplished using a dual-pressure valve arrangement. (Consult factory).

Use, Installation & Maintenance information is supplied with all valves.

SPEED CONTROL – Apply flow controls to "METER OUT" exhaust air, which will provide smooth stroke control in each direction. The recommended speed range is .25 to 4.0 feet per second.

For ultimate positioning and speed accuracy, the motor driven "IM" series is recommended.

F. MAINTENANCE:

POWER BEAM units are designed to be relatively maintenance free. The following items should however be considered.

1.0 Air supply must be clean, and sufficiently dry to ensure that condensation from the compressed air will not occur during operation. Lubrication via air supply is not required to operate the POWER BEAM, but the addition of oil to air supply will extend the maximum life.

2.0 While in service, the unit should be operated at least for a short time once per month.

3.0 Periodically inspect the service conditions, and check operation of the unit.

4.0 Environmental conditions may require occasional cleaning of exposed surfaces.

5.0 Cleaning should consist of wiping down the unit with a compatible solvent if required. A medium grit "Scotchbrite" pad will brighten aluminum sources. All cleaning solvents should be compatible with nylon, polyethylene and their compounds.

6.0 PURGE PORT: Very low pressure, low flow air supply at the standard purge port (1-3 PSI max.) to ensure a positive pressure within the enclosure, will greatly reduce the accumulation of fine dust & cool the unit in hot environments.

7.0 Replacement of dust belt at the first sign of wear or damage extends the life of POWER BEAM.

WARNING:

Turn off all electrical and air supplies to the POWER BEAM and ensure all pressure has been vented from the unit prior to performing service work.

G. TROUBLESHOOTING NOTES:

PROBLEM		SOLUTION
CARRIAGE PLATE MOVES IN THE WRONG DIRECTION:		- Reverse A and B air lines to POWER BEAM ports
IMPACT AT END OF STROKE	:	- Turn cushion screws fully in (see Fig. 7) & back out gradually until smooth operation is achieved.
ERRATIC SPEED OF MOVEMENT	:	-Install exhaust speed control. Close fully, and operate POWER BEAM. Open gradually until steady movement at the desired speed is achieved
AIR LEAKAGE	:	-Check fitting connections to POWER BEAM. Check control valve pressure ports for leakage.
IMPROPER CABLE TENSION	:	-Cables are pretensioned to 450 pounds. The cable is attached to the carriage through a stack of Belleville washers. When the washers are compressed to a solid condition, the cable tension is correct (SEE CHART). Tighten cable nuts until washers are compressed. DO NOT CONTINUE TO TIGHTEN ONCE WASHE ARE SOLID! Replace locking jam nut and secure with LOCTITE.

H. REPAIR KITS:

Parts subject to wear are available as replacement kits, as follows: (SEE ATTACHED PARTS LIST + DIAGRAM, PAGE 10,11)

CABLE KITS # 106847 (2.50), #106848 (3.25) – These consist of cable, piston, piston seals threaded cable ends, seal cartridge, cushion seals and Belleville washers. Specify cylinder diameter & length of stroke. BEARING KIT # 125060C – Consists of bearings, washers and hardware. STAINLESS BELT KIT # 106844 – Consists of stainless belt, edge seals, belt scrapers and belt splice. POLY BELT KIT #125473 – Consists of poly belt, edge seals, belt scrapers and belt splice. NEEDLE VALVE KIT # 125061 – Consists of two needle valves, "O" rings, retainers and screws.

ORDERING INFORMATION – When ordering repair kits for the POWER BEAM, specify the catalogue and serial numbers from the name plate serial number is also stamped in end caps beside ports)

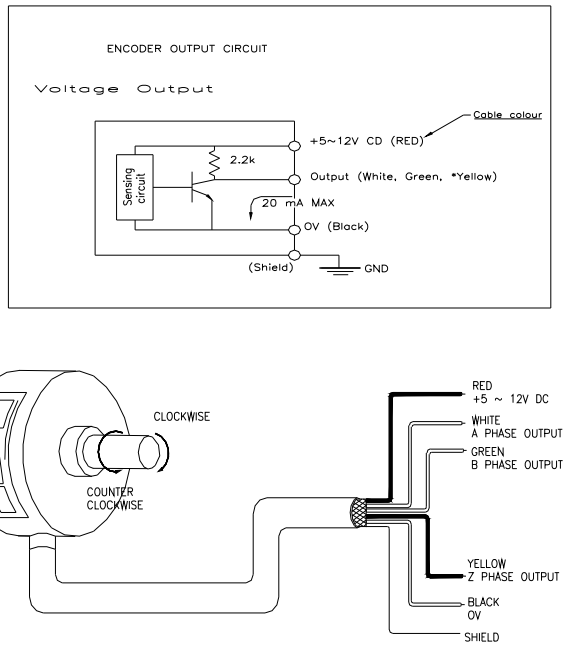


Figure 4

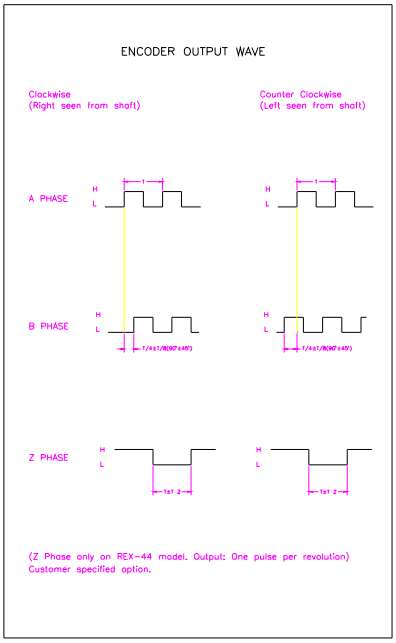


Figure 4a

I. OPTIONAL ACCESSORIES

POWER BEAM is available with the following optional accessories, installed on the unit at the time of manufacture.

KIT # 106826 - Electronic encoder mounted on pulley for use with higher speed counter or programmable logic controller (see Fig. 4) for carriage positioning. Specify number of pulses per linear inch (6 to 120). A 120-volt DC supply is required (factory installed)

KIT # 125070 – Brake kit for load holding (pneumatic)

ACCESSORY KITS:

The following accessories are available for customer installation.

SWITCH BRACKET KIT #106461 – Consists of bracket to mount a limit switch or proximity switch to control stroke length.

INTERMEDIATE MOUNTING BRACKET KIT # 106868 – Complete with 2 mounting brackets and hardware.

KIT # 106697 - 90 degree drive plate. Bolts directly to carriage and provides 90 degree offset drive plate (as per Fig. 6)

KIT # 106698 - 180 degree, wrap around drive plate for inverted mounting of POWER BEAM (Fig 5.)

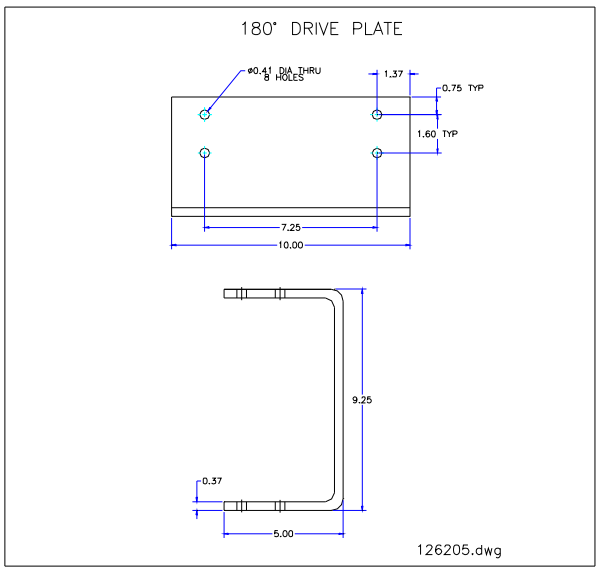


Figure 5

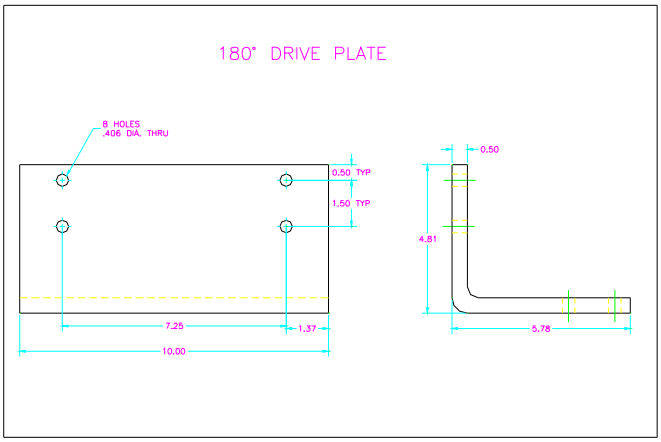


Figure 6

Optional extended pulley shafts are available for external mounting of encoders, manual cranks and braking devices. For additional information on drive plates, brackets and options, contact POWER BEAM.

BELT KIT # 106844 (STAINLESS) # 125473 (POLYESTER)

1.0 Remove (4) self-tapping screws from each end. This will allow removal of enclosure end plates and gaskets.

2.0 Remove belt scraper from each end.

3.0 Remove carriage drive plate by unfastening (4) drive plate bolts.

4.0 Slide belt from joint through edge seal and out the end-removing belt. (For ease of new belt installation, attach (tape) new belt to old belt end, and pull new belt through enclosure.)

5.0 Remove belt splice by sliding through edge seal and out the end.

6.0 Remove old edge seal from each enclosure extrusion groove.

7.0 Install new belt edge seals into grooves of enclosure extrusions with cutout on bottom surface to allow belt to form around pulley at each end. (Loctite # 770 primer and Loctite 404 adhesive achieves best adhesion)

8.0 Insert the belt splice into the edge seals and position it over the carriage.

9.0 Insert the belt into the edge seals. The belt must wrap around the pulleys. Both ends of the belt must meet on top of the center of the slice. (Ensure belt is installed between plastic belt guides at each end of beam)

10.0 Secure the drive plate to the carriage through the belt using (4) bolts. (If possible, cycle beam to ensure belt is centered during travel, re-adjust at carriage plate if necessary.)

11.0 Insert the scrapers into the edge seals at each end of the beam.

12.0 Attach the gasket and end plate to each end of the beam using self-tapping screws.

13.0 Cycle unit over full travel and observe belt for uniform smooth motion to confirm proper assembly.

BEARING KIT # 125060

1.0 Remove belt as per Belt I & M on page 4.

2.0 Lay the POWER BEAM on its side.

3.0 Remove trim strip from front enclosure extrusion, unfasten self-tapping screws and remove front extrusion.

4.0 Remove enclosure-joining strip from rear enclosure extrusion.

5.0 Repeat for the rear extrusion.

6.0 Move the carriage to the center of its stroke.

7.0 Unfasten full hex nuts and jam nuts from cable-threaded terminals with an 11/16 wrench, then remove Belleville washers noting method of installation and quantity of washers per side. These washers are installed in series as per quantities stated on usage chart. (page 7)

CAUTION: PROTECT THE CABLES FROM CONTACT WITH FLOOR, SHARP EDGES, OR ANY CONTAMINATES AT ALL TIMES. CHECK THE CABLE THOROUGHLY FOR DAMAGE PRIOR TO ASSEMBLY AND PROTECT FROM DAMAGE DURING ASSEMBLY. REPLACEMENT IS RECOMMENDED FOR CABLES WITH DAMAGE TO THE NYLON JACKET.

REPLACING BEARING BLOCKS ONLY (REUSING LINEAR RAIL):

8.0 While leaving bearing rail installed, reverse (8) ½" flat head bolts incrementally until "H" section beam and rail assembly clears end caps. Lift "H" section beam, rail and carriage assembly from cylinder end caps, place on work surface.

9.0 Remove bolts from carriage and remove carriage from bearing blocks. Slide bearing block from rail. (Note orientation of grease fittings on bearing blocks) Clean linear rail surfaces and inspect for excess wear or damage. If the rail is worn or damaged, continue to step 9.1. If rail is satisfactory, skip to step 10.0.

9.1 REPLACING BOTTOM MOUNT LINEAR RAIL: Remove bearing blocks from rail. Store bearings on retainers in they are to be reused. Remove the bottom mount screws and place the rail aside. Clean the H section of the beam, the screw holes and the screws. Use the polishing pad to be sure that the surface is clean and free of debris. Lay the new Bottom Mount Rail on the beam and align it with the holes. Install a low head screw in every fifth hole finger tight, and be sure to mark the hole position. Align the rail parallel to the beam, 2.40" from the outside of the channel to inside of the rail and hand tighten the screws. Apply 242 loctite to the remaining screws and install them in the empty holes and tighten them to 150 in/lbs. Once the rail is aligned and the screws are tightened, remove the dry screws apply loctite to them and reinstall them.(torque to 150 in/lbs).
(Note: When using stainless screws, clean them with solvent, apply loctite primer #7649 to the screw holes and screws. Then use the 242 loctite on them and install and torque them to 150 in/lbs.)

10.0 Line up new bearing retainer with end of linear rail and, noting orientation of grease nipple, slide new bearing on rail. (Grease nipples should face center to line up with grease access holes in "H" channel.)

11.0 Using grease gun (with B22 grease) apply grease to each bearing. Manually cycle bearing back and forth a minimum distance of four times the length of the bearing block for four to six times. Repeat until grease appears at both ends of bearing.

12.0 Reassemble carriage to bearings, Torque bolts to 209 inch pounds.

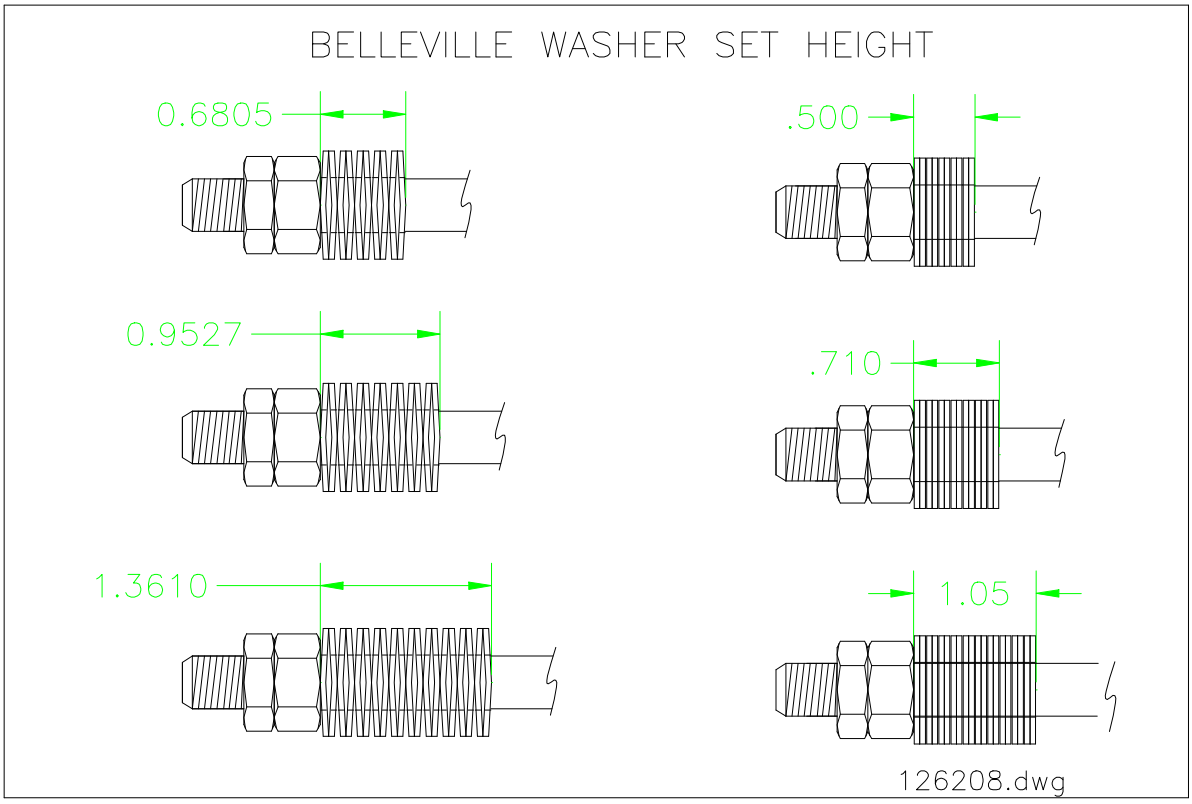
13.0 Apply Loctite 242 to (8) flat head bolt threads. Reassemble "H" section beam, linear rail, and carriage assembly to end caps. Torque bolts to 25 foot-pounds.

14.0 Reassemble cables to carriage. Adjust Belleville washers the specified stack heights shown ON Belleville Washer usage chart (page 7). Reassemble enclosure extrusion, front and rear, bottoming extrusion on top of "H" beam and center extrusion on end cap mounting holes.

15.0 Install belt as per I&M on page 4.

BELLEVILLE WASHER USAGE		
STROKE LENGTH IN INCHES	**NO. OF WASHERS PER SIDE**	**SET HEIGHT + / - .010**
24 TO 60	10	.500
72 TO 120	14	.710
132 TO 228	20	1.05

Figure 7



CABLE KIT / 2.50 DIA. - # 106847 / 3.25 DIA. # 106848

1.0 Remove belt as per Belt I&M on page 4.

2.0 Lay the POWER BEAM on its side.

3.0 Remove trim strip from front enclosure extrusion, unfasten self- tapping screws and remove front extrusion.

3.0 Remove enclosure-joining strip from rear enclosure extrusion.

4.0 Repeat the same for the rear extrusion.

5.0 Move the carriage to the center of its stroke.

6.0 Unfasten full hex nuts and ham nuts from cable-threaded terminals with 3/8" and 11/16" wrenches, then remove Belleville washers noting method of installation and quantity of washers per side. These washers are installed in series as per quantities stated on page 7-usage chart.

7.0 While leaving bearing rail installed, reverse (8) ½" flat head bolts incrementally until "H" section beam and rail assembly clears end caps. Lift "H" section beam, rail and carriage assembly from cylinder end caps. Place on work surface.

9.0 Refer to expanded view on page 10 for assistance when necessary.

10.0 Loosen hose clamp at right hand air hose fitting position at back of cylinder end cap.

11.0 Hold plastic air hose while loosening air hose fitting with a 9/16" open-end wrench until disconnected from end cap.

12.0 Pull air cylinder over o-rings and disconnect from cylinder end cap at each end.

Cont'd…

Cable kit cont'd.

CAUTION:
PROTECT THE CABLES FROM CONTACT WITH FLOOR, SHARP EDGES, OR ANY CONTAMINATES AT ALL TIMES. CHECK THE CABLE THOROUGHLY FOR DAMAGE PRIOR TO ASSEMBLY AND PROTECT FROM DAMAGE DURING ASSEMBLY. REPLACEMENT IS RECOMMENDED FOR CABLES WITH DAMAGE TO THE NYLON JACKET.

13.0 Shift cylinder end caps upside-down and remove seal cartridge retaining rings at each end with external retaining ring pliers.

14.0 Using a ¼" dia. punch tap seal cartridge out through bore of cylinder end cap at each end. Be careful not to damage sealing surfaces of cylinder end cap, and cable nylon coating. Cover threaded cable ends to prevent damage.

15.0 Remove old cable and piston kit from air cylinder and pull threaded cable terminals from carriage location over pulleys and through bores of cylinder end cap.

16.0 Apply oil film to cylinder bore. Install new cable and piston kit by sliding the piston assembly into the cylinder. Apply adequate grease to assist piston to move back into the cylinder.

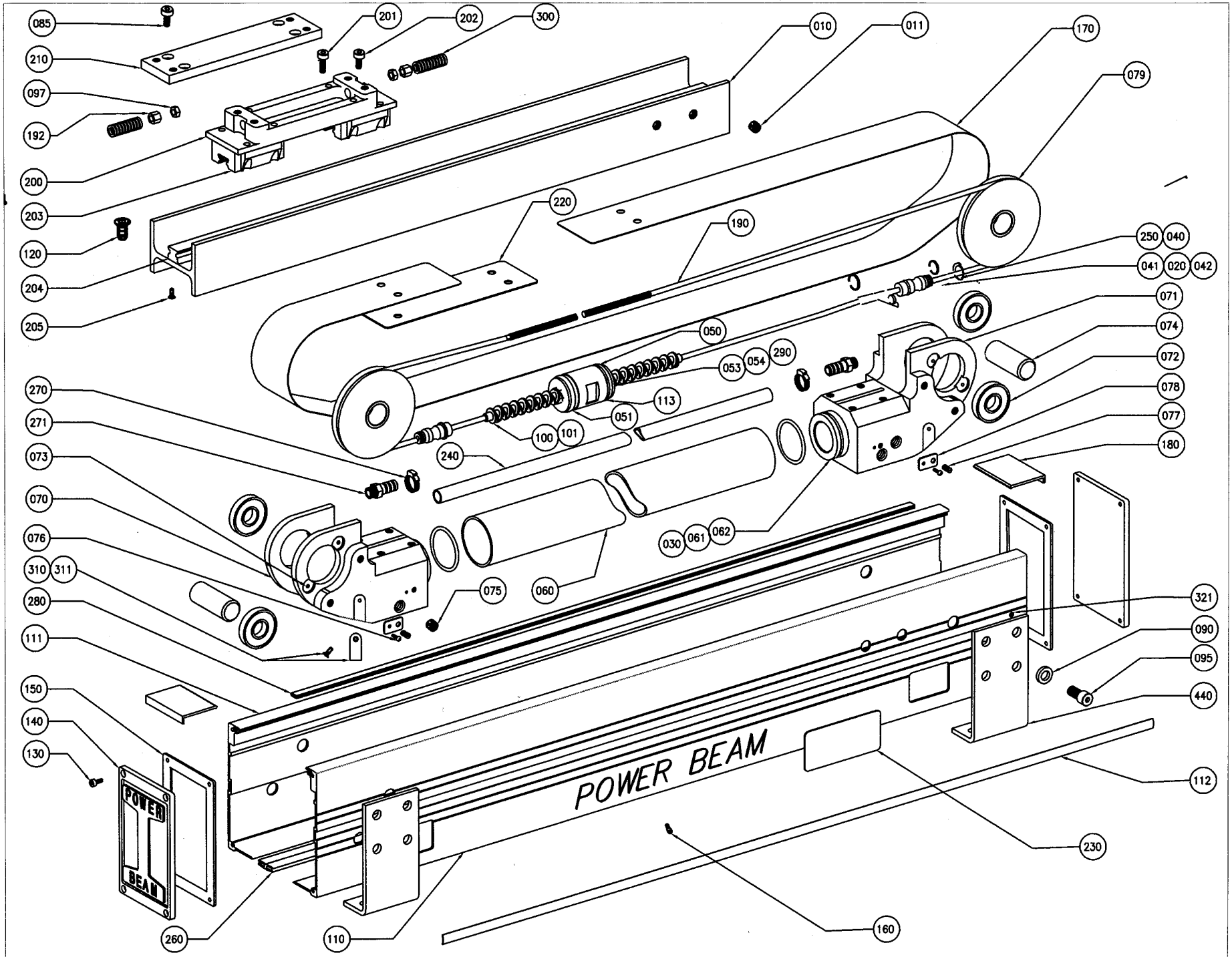
17.0 Position the piston assembly approximately in the middle of the cylinder.

18.0 Guide the threaded cable terminals through the bores of the cylinder end caps.

19.0 Lubricate the seal cartridge o-rings and bore then press into the cylinder end cap. The cartridge will protrude from the back of the end cap when it is fully home. Install the retaining ring in its groove to secure cartridge at each end.

20.0 Lubricate the o-ring on the cylinder boss of each end cap and carefully work the bosses into the cylinder taking care not to damage the o-rings.

21.0 Reverse items 1 through 11 to complete assembly of the POWER BEAM.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CATALOGUE NO. 1A250D024 to 1A250D144

DRAWN BY: C.O	CHK'D. BY: L.S	APP'D BY: L.S
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	NEW ISSUE			

CHANGE LETTER / A B

Cable Driven Power Beam

ITEM	CABLE KIT	BELT KIT (POLY)	BELT KIT (ST/ST)	BEARING KIT	DESCRIPTION		QUANTITY
010					CHANNEL ASSY	CTL	1
011					PIPE PLUG (Channel)		2
020	*				"O" RING (Cartridge)		2
030	*				"O" RING (2.00")		2
040	*				"O" RING (Cartridge)		2
041	*				CARTRIDGE		2
042					CABLE SEAL		2
050	*				PISTON (2.5" or 3.25")		1
051	*				PISTON RING		1
053	*				SPRING		2
054					LOCK NUT		4
060					CYLINDER (2.5" or 3.25")	CTL	1
061					ADAPTOR PLATE		2
062					ADAPTOR "O" RING		2
070					END CAP ASSY L.H.		1
071					END CAP ASSY R.H.		1
072					BEARING (SEALED)		4
073					BEARING LOCKING SCREW		4
074					SHAFT		2
075					PIPE PLUG		1
076					RETAINING SCREW		2
077					NEEDLE VALVE - O-RING		2
078					RETAINER PLATE		2
079					PULLEY		2
085					BOLT (CARRIAGE)		4
090					WASHER (Mounting Bracket)		8
095					BOLTS MOUNT BRKT.		8
097					CARRIAGE NUT		4
100					WASHER (3/8 / 7/16 STD)		2
101	*				CUSHION SEAL		2
110					FRONT COVER	CTL	1
111					REAR COVER	CTL	1
112					COVER STRIP	CTL	4
113	*				RIDER RING (7.5" or 9.87")		1
120					BOLT (FL. HD. CHAN.)		8
130					SCREW (END PLATE)		8
140					ENCLOSURE END PLATE.		2
150					GASKET END PLATE		2
160					SCREW (EXTRUSION)		–
170		*			BELT - POLYESTER	CTL	1
180		*			SCRAPER - (POLY)		2
181			*		BELT - STAINLESS STEEL	CTL	1
182			*		SCRAPER - (ST/ST)		2
190	*				CABLE ASSY.		2
192	*				HEX NUT (CABLE ASSY)		2
200					CARRIAGE ASSY		1
201					CARRIAGE MOUNTING SCREWS (M8 x 30)		4
202					CARRIAGE MOUNTING SCREWS (M8 x 20)		4
203					LINEAR BEARING BLOCK		2
204					LINEAR BEARING RAIL		1
205					SCREW (LINEAR RAIL)		–
210					CARRIAGE PLATE		1
220		*	*		BELT SPLICE		1
230					LABEL		1
240					TUBE (POLYPROPYLENE)	CTL	1
250	*				RETAINING RING		2
260					JOINING STRIP	CTL	–
270					HOSE CLAMP		2
271					BARB		2
280		*	*		EDGE SEAL	CTL	2
290	*				BUMPER PISTON		2
300	*				BELLEVILLE WASHERS		–
310					WEAR BLOCKS		4
311					Belt Guide Screw		4
321					Purge Port Plug		1
440					SUPPORT BRKT		4

FEATURE	FREQUENCY	VISUAL INSPECTION / REPLACEMENT OR END OF SERVICE LIFE INDICATED BY:
Belt	2000 HRS / OPERATION	Remove enclosure end plates/gasket and visually inspect belt for dents and/or cracks along edges. Cycle unit with end plate/gasket off observing any grinding sounds. Install belt kit #125473-lgth (polyester) or # 106844-lgth (stainless steel), if one or more of the above faults are observed.
Pulley Bearings	2000 HRS / OPERATION	Remove end plates/gaskets & belt, loosen cable hex nuts and rotate pulley at each end checking for bearing roughness or binding and noise. Install new bearings # 106632-002 if one or more of the above faults are observed. Adjust the Belleville washers to set height on page 6 of I&M, then lock the hex nuts together.
Carriage Bearings	*2000 HRS/ OPERATION	Remove end plates/gaskets & belt, cycle unit and observe carriage for smoothness of motion and bearings for grinding noise. Install bearing kit # 125059C if one or more of the above faults are observed.
Cable	2000 HRS/ OPERATION	Remove end plates/gaskets & belt, pressurize each end of unit & check for air leakage at cable/end cap area, check nylon jacket of cable for deformation or damage and check Belleville washers for cracks. If any of the above faults are observed, install cable kit # 106847-lgth. (2.50 dia.) or # 106848-lgth. (3.25 dia.)
Cushion/Deceleration Needle Valve Kit	2000 HRS/ OPERATION	Check for air leakage past o-ring on needle valves and for erratic operation of deceleration adjustment (indicating damage to needle valve nose). Install kit #125061 if either of the above faults are observed.

- FOR CONTINUOUS CYCLING APPLICATIONS, IT IS NECESSARY TO EITHER PROVIDE CONTINUOUS OIL LUBRICATION OR FREQUENT GREASE LUBRICATION, DEPENDING UPON THE SEVERITY OF SERVICE. IN APPLICATIONS INVOLVING PAPER DUST AND OTHER SIMILAR ABRASIVE CONTAMINANTS, RELUBRICATION MUST BE RESORTED TO AT MORE FREQUENT INTERVALS.

NOTE: SEE INSTALLATION AND MAINTENANCE INST.(#106854) FOR REPLACEMENT KITS

Below is a reference list of adapters, bearing grease and vendors.

PART #	MANUFACTURER	PRODUCT DESC.
#28-2766-2 R7L	LubriMatic Div. of Whitco Corp. Olathe, KS 66061	Seal off adapter
##83278	Lincoln Canada (416) 678-7050	Needle Nozzle
#Br2-Plus	6Dow Corning Canada Inc.	Grease Br2-Plus Cartridge